

Deep Water Collections of Opisthobranchs in Central California

BY

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(2 Text figures)

LITTLE IS KNOWN concerning the biology of opisthobranch mollusks in the deep water continental shelf areas of California. A few papers report the depths and locations of particular deepwater species (SMITH & GORDON, 1948; HANNA, 1951; CHIVERS, 1966; MACFARLAND, 1966; BERTSCH, 1969; CARLISLE, 1969; LEE & BROPHY, 1969; McDONALD & NYBAKKEN, 1975). Many more reports are available, however, describing the ecology of those species residing in shallow inshore waters.

This report describes the findings of 6 opisthobranch species from 3 deepwater trawls off Central California. The species, their depths (several representing substantial extensions) and associated food items are discussed.

METHODS

Opisthobranchs were collected in conjunction with normal commercial trawl fishing activities on the vessel *Silver Queen*. The senior author accompanied the fishermen to collect any non-commercial specimens brought up in the trawls. Trawl samples were sorted on board and all invertebrate material was preserved in 10% buffered formalin solution and taken to the laboratory for further examination. In the laboratory, the stomachs were opened and flushed with formalin solution and the contents were examined microscopically for food material, which was then identified to the lowest taxonomic level possible.

Opisthobranchs were found in 3 of 11 trawls, taken 9.6 km off Point Piedras Blancas, California (Figure 1), January 27 to 31, 1978. Trawls ranged in depth from 112 to 360 m, and lasted 3 to 5 hours at a speed of 2 knots.

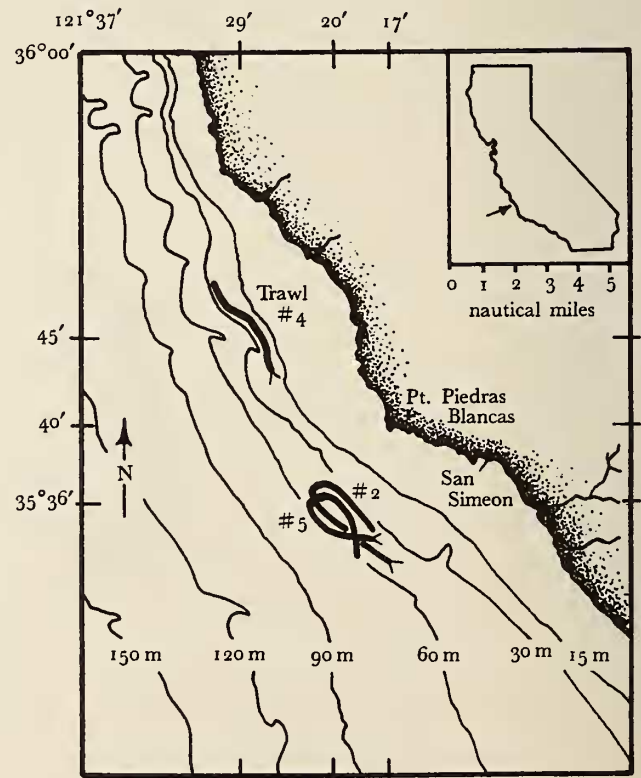
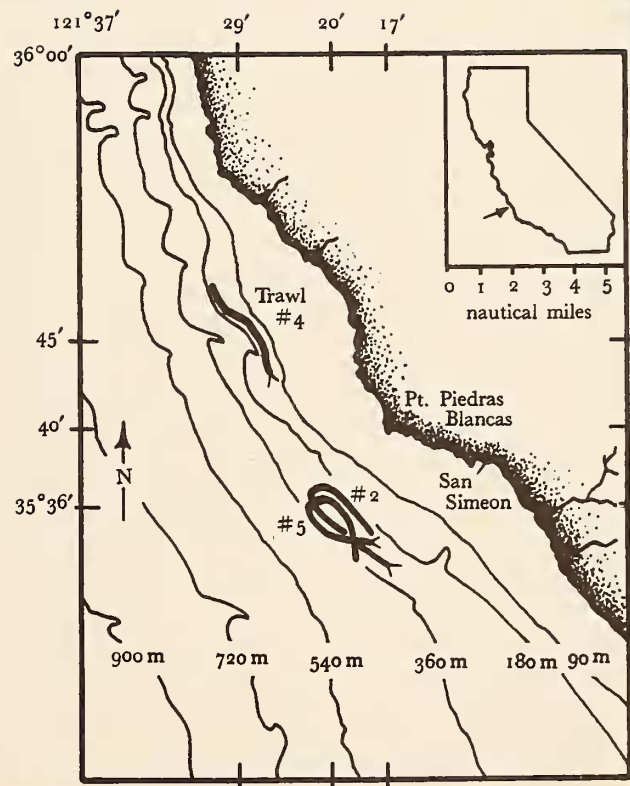


Figure 1

Map of Point Piedras Blancas area showing location of the 3 trawls

The original map submitted with the manuscript showed depth contour lines labeled in "f". As The *Veliger* is strictly metric, the measurements were converted to "m". However, after publication, we were informed that "f" stood for "fathoms", not "feet"; the abbreviation should have been "fm". We present herewith a corrected version of the map with the suggestion that it be pasted over the incorrect map on page 282 of volume 22. Caution: do NOT use rubber cement.



OBSERVATIONS AND DISCUSSION

In spite of the obvious geographical separation of trawl 4 from 2 and 5 (Figure 1), we have chosen to discuss trawl 2 and 4 together as the first collection because of the similarity of species composition and substrate. Trawl 5 is treated separately as a second collection.

Trawl number 2 (Table 1), taken January 27, 1978, occurred at a depth of 236 - 291 m. Substrate materials sorted from the trawl were mud, sand and boulders. Trawl number 4, although shallower (107 - 218 m), produced similar bottom materials. The species composition of live material from the 2 trawls was the same (Table 2).

A single specimen of *Pleurobranchaea californica* MacFarland, 1966, was collected in each trawl. They measured 100 and 95 mm (preserved), respectively. Our collections are consistent with CHIVERS (1977) who reported the bathymetric range of the species to be 9 to 369 m and its substrate to be green mud.

Stomach contents analysis of the *Pleurobranchaea* from trawl 2 produced an interesting assemblage of food items which we feel gives an accurate account of this species' benthic foraging existence. The stomach material included 5 specimens of an unidentifiable species of *Aglaja*. The specimens ranged from 6-8 mm in length (preserved). The cephalic shield and mantle were mottled brown in

Table 1

Trawl Location and Substrate Data

Trawl #	Date	Depth (m)	Latitude	Longitude	Substrate
2	Jan. 27, '78	236-291	35°30'17"N	121°10'47"W	Mud, sand and boulders
4	Jan. 28, '78	107-218	35°40'15"N	121°20'30"W	Mud, sand and boulders
5	Jan. 29, '78	277-332	35°30'25"N	121°10'57"W	Mud, compacted mud boulders

Table 2

Species Composition of Trawls

Species	Trawl Number		
	2	4	5
Cephalaspidea			
Scaphandridae			
1. <i>Acteocina intermedia</i> Willett, 1928			X
Aglajidae			
2. <i>Aglaja</i> sp. indet.	X (from stomach of spec. 4)		
3. <i>Chelidonura inermis</i> (Cooper, 1863)			X
Notoaspidae			
Pleurobranchidae			
4. <i>Pleurobranchaea californica</i> MacFarland, 1966	X	X	
Nudibranchia			
Doridacea			
Cadlinidae			
5. <i>Cadlina</i> sp.			X
Dendronotidae			
6. <i>Dendronotus frondosus</i> (Ascanius, 1774)	X (from stomach of spec. 4)		

color and the foot was white.

An intact radula of *Dendronotus frondosus* (Ascanius, 1774) was also found in the stomach of this *Pleurobranchaea*. The radula agreed in every respect with that described in McDONALD (1977). This finding should establish the occurrence of *D. frondosus* at this depth in California waters. Its deepest occurrence in California is reported to be 19 m (SPHON & LANCE, 1968) and 40 m at Friday Harbor, Washington (ROBILLIARD, 1970). In the Atlantic, this cosmopolitan species is reported to 400 m (SWENNEN, 1961).

Also found in this stomach were 2 isopods, possibly juveniles of the suborder Flabellifera, copepod exuvia, many minute fish scales and sand and silt particles. The presence of fish scales would be expected from an animal which feeds by sucking its invertebrate prey off the mud surface.

The stomach of the *Pleurobranchaea* from trawl 4 contained several transparent "tunicate-like" organisms. They were too digested to allow for a more precise identification. The only other reports of food preferences of this species are COAN (1964) and CHIVERS (1966). However, these were laboratory observations and did not include prey species which would be available to *Pleurobranchaea* in nature.